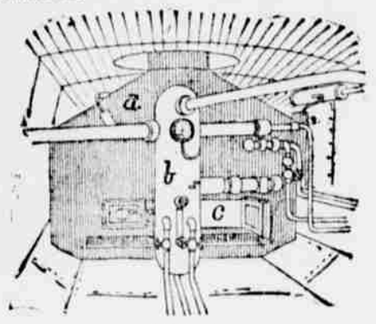
SCIENCE AND PROGRESS

Engine and Boiler of the Fast Steam Yacht Stiletto.

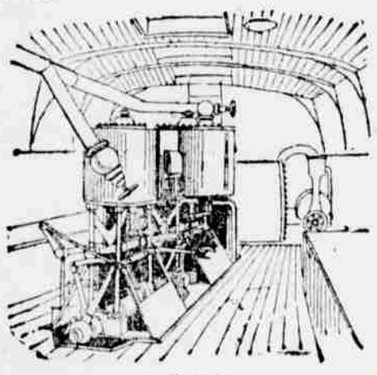
Few things appeal to the enthusiasm of an intelligent person like a fine piece of machinery. It is the conquering of inert matter, the taking possession of it and imbuing it with life, and making it do the bidding of mind. We admire it; we pay homage to the brain that created it.

Such a piece of mechanism is presented by the propelling apparatus of the Stiletto. This, the reader will remember, is the little yacht which recently beat the crack steamer of the Hudson river, "and didn't half try," either. We reproduce some portions of her machinery from a sketch in The Scientific American.



BOILER.

It is of a pattern invented by Nathan G. Herreshoff, the blind builder of the Stiletto. The figure with cone-shaped top, *a*, represents the firebox. It is 6 feet 3 inches square. Inside is a system of tubing, which constitutes the boilers. Sets of the tubes run alternately lengthwise and crosswise to the yacht, the last set being placed crosswise. At the ends the tubing is bent into U-shaped joints. The boiler consists, in fact, of alternate layers of lengthwise and cross tubes, connected together. The last layer is only a little above the fire. The boiler is fed from the top by a pump. That which goes in as water circulates all through the tubes, gets hotter and hotter, and comes out steam and boiling water below, in the last layer. There it passes into a separator, which is seen at *b*. One of the fire doors of the furnace is open at *c*. The separator is 4 feet long, conical at the ends, as seen in the illustration. In it the steam and water divide. The water sinks to the bottom, which is connected with the pumps, and these return it to the boiler. The steam passes directly to the engine from the separator. A blower is used, giving artificial draught.



ENGINE.

The engine is a compound condensing one. It has a piston stroke of 12 inches, ⅝ cut-off, and 2 cylinders, 12 and 21 inches. The exhausted steam passes into a surface condenser, and turns to water. Thence it is taken by the pumps into the boiler again. Thus there is one steady circulation of water. First it is fed into the top of the set of tubes, thence it passes to the separator; thence the steam goes to the engine, to the high and low-pressure cylinders, and is used; from that it passes to the condenser and becomes water, ready to be pumped back to the top of the boiler tubes. The water is fed into the boiler constantly, and only in the needed quantity, a little at a time. It regulates itself. There is no need of a raging fire to heat a vast bulk of liquid at once. This is the strong feature of the little Stiletto's engines. It has a force of 450 horse-power, and yet consumes only 900 pounds of coal per hour. The saving in fuel is unheard of. Besides this, the boiler will be always full of water, and there will be no danger from explosion. The next point of interest in this engine is its light weight, and the small space it occupies. Steel is largely used in its construction, and it weighs only 4,275 pounds. The tubing which constitutes the boiler has a heating surface of 615 square feet. It will safely bear 160 pounds steam pressure, but in the race with the Powell only 125 pounds was used.

Wooden and Iron Ships.

All the large wooden sailing ships now on the seas were built in America. Before the day of iron steamers America headed the ship-building industry. That was before the war. But now we are nowhere. We have no navy, no iron steamers and no nothing. On the Maine coast, however, wooden sailing vessels of large size are still occasionally built. Workmen in a shipyard at Camden, on the Penobscot bay, are finishing a four-masted vessel 285 feet long, somewhat more than half as long as the great Atlantic steamers. The largest sailing vessel afloat, however, is the Three Brothers, 315 feet long. She was built in a New York shipyard before the war. But she, too, has left us, followed the departed glory of the American merchant marine over seas, and is owned in Bremen and sailed under the German flag.

In size of wooden sailing vessels there is first the Three Brothers, 2,972 tons; next, the unfinished one at Camden, 2,600 tons, and third, the Ocean King, 2,516 tons. There are scarcely more than a dozen wooden sailing vessels afloat that register over 2,200 tons.

There are some large iron and steel sailing vessels, but, with one exception, these were all built in British shipyards. The largest is the New York, 2,609 tons, built at Greenock, Scotland. The wooden ship building industry seems to be dying out.

Our Continent Before the Advent of Human Life.

In mapping out the public domain it has been found that our western plains and mountain ranges furnished rare opportunity for the study of the conditions of the continent before man existed here. There were two great inland seas in the western basin. Salt lake is all that is left of them. The Gulf of Mexico covered nearly all of what is now the southern states. The great mountain ranges had already been thrown up, but they were higher and rougher than they are now. A great ice-sheet poured down from the north and west, and covered the country from the Atlantic coast to the western edge of the middle portion of the country. Wisconsin was an island in the midst of a sea of ice. We think the ice river has not got done flowing yet when a Manitoba wave comes down upon us from the north.

A map of the continent as it was then would be worth seeing. There were animals to the south of the ice. There was a small horse with toes, a hairy mammoth bigger than an elephant, a pig with a nose like a knife blade, and a buffalo three times as large as he of our day is. Man was not and did not come for several thousand years.

Tempering Steel.

To be able to properly temper steel springs and implements may be considered a gift similar to that possessed by the "poet born." A man whose business in a certain toolshop was to temper springs, worked 22,000 consecutively, and of the whole number only six failed to pass the test; but during his temporary illness more than half the springs handled by his assistant, who had been under instruction a year, failed. In a large manufactory of sword blades one man does all the tempering, being called in from other employment at intervals, because, although he has always been willing to instruct others, he has never had a pupil who could equal him in the work. There is a large scythe manufactory in a New England town making 14,000 dozen scythes a year, and the president of the company has for years hardened and tempered every scythe that leaves the works, because no other man in the works can do it so well.

Faith and Mind Cures.

Do not scoff at them; do not accept them. It is very possible that there is a force in nature that is not yet understood. It may be as powerful as electricity. It may be as much finer than that force as electricity is finer than steam. Much as we know in our day, it would be preposterous to say we know everything. This force, not yet known or understood, may be at the bottom of faith and mind cures and of spiritual manifestations of all grades. That there is such a force some of the most learned and scientific men of the time are inclined to admit. Those who seem to work wonders are those who begin to understand how to use it.

Mental Power.

Dr. Charles Heitzman says that intellectual force depends on the amount of gray matter and the number of ganglia in the brain. A ganglion is a little reddish-gray knob or swelling in the brain matter. The more of these knobs, or ganglia, the more brain force the person will have. A funny writer says that, according to some, the brain is a sort of gland that secretes thought as a cow produces milk. In this the funny man may be nearer right than he thinks.

Facts of Interest.

The wheels of the English hansom cabs are made in America.

Bed spreads and pillow-cases are now made of white paper.

Only 1 per cent. of the soil of Florida is fit for orange cultivation.

Great plantations in Guatemala are devoted to the culture of the cochineal bug.

If you weigh all the hair upon your head and then weigh a single hair you can figure out how many hairs there are altogether.

Mr. Lennox Browne, an English physiologist, finds that drinking and smoking affect the vocal organs, statistics furnished by no less than 380 professional vocalists having shown him that a singer should avoid all stimulants.

One of the most convenient among the various electrical contrivances which have been brought forward as auxiliaries is an English device, enabling a person ringing a bell to know whether, on making contact, the bell actually rings.

Ozone is a blue gas. That is what makes the sky blue. Ozone is obtained from oxygen by a method known as the silent discharge. When ozone is condensed under great pressure it becomes a deep indigo blue gas. The compression must be very slow, or it will explode with heat and lightning.

THE FASHIONS

Handsome Street Toilets.

FIG. 1 FIG. 2.

We present here two tasteful gowns designed for us by Redfern, the ladies' tailor of New York. Figure 1 shows a costume of bottle green, trimmed with red. The red faces the folds down the skirt in front. The cuffs are bound with it. The high, standing open collar is lined with red, and the epaulets and folds that meet in a point at the button on the waist line are also of a red woolly striped trimming fabric. Bottle green hat lined with red. Red plume and light brown bird upon the front. Light brown gloves and white linen cuffs and collar. The costume may be made of either silk, cloth or sateen. The large buttons are covered with gilt braid.

Figure two is a brown cloth costume, trimmed with buttons and dull gilt braid. The waist opens at the side. A corner of the overlapping front is turned down and faced with a lighter brown. The cuffs are arranged in the same way. Turban of brown uncut velvet, with feather pompons of the lighter brown. This is a neat, trim, little dress, without so much bunching and bustle as most of the present costumes have.

Novelties.

HOT-WEATHER CORSET—BOYS' STRAW CAP.

Among the devices to help a woman to keep cool these days we have the corset above. It is woven of tapes crosswise, with space between to let air through. Next to nothing it is about as cool a corset as can be worn. It is very different from the heavy, padded article, woven so stiff and close as to be entirely impervious to air. That walls a woman in, so to speak. Another light and airy corset is made, between the steels and tapes which hold the stays and whalebones, entirely of a coarse and heavy bobinet. This stake it. That fall, when the plants have been growing a year, prune the strong plants back to three buds each, the weak ones to one or two. They ought to grow three or four feet the first year. The second summer cultivate the ground as before, and hoe around the plants. Stir the soil, but do not disturb the roots. The three buds you left last fall will this summer become strong branches that are to bear fruit next year. Let the two stronger grow, pinch back the top of the weakest. Pinch all back when they have grown to be three feet long. Then they are trained to a wire trellis, which looks something like a fence with only two strands of unbarbed wire. The shoots are carefully separated, so that the sun and air may get to all the leaves and clusters. This is important, as it prevents mildew and rot. Pruning is done through the fall and winter.

The wire trellis method is claimed to be far superior to the old-fashioned way of staking the stalks.

Tie the vines to the wire trellis with willow twigs or twine. Severe pruning back is good for the vine. Pinching off the tops of long lank growths with the thumb and finger, and rubbing off superfluous shoots in the summer when the sprouts are green and tender is an excellent way to prune grapes. "Summer pruning is the preparatory, fall pruning the finishing part," says a writer.

Breaking Colts.

The author of the following excellent hints in The Indiana Farmer should have added one point. He should have mentioned that the right way to break a colt is to begin by petting and handling it when it is only a few weeks old. Feed it from your hand, rub and stroke it, train it to follow you till it becomes "as gentle as a dog." Then, when breaking time comes, half the battle will be fought. It is a common mistake, moreover, to break colts to labor too young. They ought not to be put at hard work before they are four to five years old. The writer in The Farmer says:

In breaking colts to work one should be very careful with them. Let them know that you are not going to hurt them and they will soon learn that you are their friend, and you can teach them almost anything. But if you commence to whip and jerk them right and left in the start for every misstep they make they will be afraid of you and make more blunders than they would if you had treated them kindly and gently. Colts are very often spoiled when working to a plow or harrow by allowing them to get their feet out of the traces, and to kick. They very seldom forget their bad habits. The best plan is not to let them get their feet out of the traces, but if they do unhitch the trace and get them back all right before they know it, and there will be no trouble.

To break colts to work in the shafts they should be worked to a cart for a while. Teach them to walk first. That is where a great many farmer boys make a mistake in breaking their colts to drive. They will start them into a brisk trot, and for a long distance, before they will let them walk. Then they will whip them every time they shy. That only makes them worse, for every time they shy they will expect to be whipped. Colts, as a general rule, are more easily broken from shying at objects on the roadside by letting them have time to look at the object they shy at a few minutes, till they see what it is, but if the driver whips them and makes them go by in a hurry, and don't give them time to see what they are shying at, it will be some trouble to get them broken from this bad habit. It is all very well to have a whip handy and use it if nothing else will do, for sometimes it is necessary to use the whip, if the driver knows when to stop. But that is too often the fault with some drivers; they whip too much.

Wool.

The clip of wool is ready waiting for market, but the price is still in the trough of the sea. Wool growers are in the dumps. In some localities the clip is below that of last year. The market presents some unparalleled features. For four years prices have been depressed to the lowest notch. Such long-continued poor prices are unheard of.

Everybody is waiting for something to turn up. The Texas wool clip will amount to 30,000,000 pounds, prices down to nothing. In Ohio small sales of the finest wool have been made at 33c. In the New York market prices are at the lowest, with very little demand. It is the same in Boston. Everybody is grumbling, and at the same time hoping for better things. This much is certain. Better times always come by and by, if people can only afford to wait long enough. The stagnation cannot continue forever. It begins to look already as though the tendency was to start upward. At any rate, even now don't sell off your sheep. They are bound to pay again in time.

No Work, No Oranges.

The idea that fortunes are to be made in Florida without sweat of the brow is the fiction of land speculators. An orange grove in Florida is not worth a cent more than an apple orchard in New England until its owner has put into it years of hard work, much money and much impatient waiting. A writer thinks it could be demonstrated that a good apple orchard pays a larger interest than the best orange grove in Florida.

A Day's Work in Plowing.

A smart team turning a good furrow in spring, either stubble or sod, should be able to turn over one and a half to two acres. When larger days' work than this are reported it is usually at the expense of the team, or perhaps of the plowing. So much depends on the character of the work in fitting the land that a poor plowman should not be tolerated, however large a day's work he may claim to be able to do.

Things to Do and to Know.

A dollar per year to the hen is considered a fair profit on poultry.

Pinch back the long main shoots of melons, squashes and cucumbers.

There is at present great discussion as to whether bees injure young fruit or not. Opinion seems about equally divided. How is it?

The red wood posts of a fence erected in Napa, Cal., thirty two years ago were recently removed and found in as good condition as when first put into the ground.

White clover is abundant, and the basswood never promised a greater amount of bloom. Up to the present time everything that has bloomed has yielded honey profusely.

Cultivate the potatoes fully and thoroughly before the roots have so extended that cultivation will sever them. Never run a plow between the plants after they are a foot high—and the same may be said of corn.

The strawberry crop of the eastern shore, Md., is more profitable than the oyster crop. This region promises to become the great trucking garden of the Atlantic coast, and there is very little improvable land in it that is not now under cultivation.

Extra frames of comb packed away for future use will require looking after occasionally to see that they do not become infected with worms. Should the latter make their appearance they may be destroyed by fumigating with sulphur.